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ABSTRACT

Part of a system by which local education agency (LEA) personnel may evaluate secondary and postsecondary vocational education programs, this sixth of eight components focuses on the evaluation of students' occupational competence based on the identification of job tasks. The component makes use of existing Vocational-Technical Education Consortium of States (V-TECS) catalogs to assist LEAs in identifying tasks and competencies essential to occupational success. Included also are suggested procedures and sample instrumentation for use by the LEA in developing their own system of competency identification in the absence of V-TECS catalogs appropriate for the program area being evaluated. The component also provides procedures for determining the occupational competence of program graduates or those leaving early with marketable skills so that by comparing the skills developed in the instructional setting against those identified as essential, through V-TECS or task analysis, the LEA may draw conclusions as to the adequacy of the instructional program. Sample evaluation materials and a brief bibliography and glossary are appended. (Each of the other seven components and an overview guide, CE 011 609, are available separately.) (JT)

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COMPONENT 6

EVALUATION OF OCCUPATIONAL COMPETENCIES

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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DATA-BASED LOCALLY DIRECTED EVALUATION

OE 011 615

DATA-BASED LOCALLY DIRECTED EVALUATION
OF
VOCATIONAL EDUCATION PROGRAMS

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COMPONENT SIX

EVALUATION OF OCCUPATIONAL COMPETENCIES

I. Overview

The success of vocational education training programs depends on how well program participants and graduates are equipped to perform on the job. A commonly accepted premise among vocational educators is that program excellence can be achieved only when students are prepared with the necessary tools for successful employment. Thus, the evaluation of occupational competence is an essential component of an effective locally directed evaluation system.

The evaluation of occupational competencies will help justify decisions regarding program offerings and insure harmony between education programs and specific job requirements. The competencies of program graduates and participants bear heavily upon employer satisfaction.

An evaluation of occupational competencies involves: (1) the identification of competencies that program completers and other program participants need for successful employment, (2) the measurement of the competence of program completers and participants, and (3) a description of the discrepancies between items one and two. This will assist the LEA in responding to state vocational education instructional program review standards for measuring the results of student achievement.

The identification of occupational competencies involves a detailed description of tasks associated with a specific job and a systematic breakdown of those tasks into various sub-tasks or competencies. This systematic clarification process sorts occupational tasks according to frequency, complexity, and importance to each job. Competency identification includes identification of knowledge, skills, and attitudes considered essential for successful completion of a given task. Students should show that they have acquired those competencies essential for success on the job prior to employment.

II. Suggested Procedures

Identification of Occupational Competencies

Two techniques can identify essential tasks and competencies of prospective employees. The first technique entails the use of Vocational-Technical Education Consortium of States (V-TECS) catalogs to help identify accurate description of skills required for successful job performance in the world of work. The second is to conduct a local occupational (Task) analysis.

V-TECS

The Vocational-Technical Education Consortium of States is a voluntary organization consisting of some 20 states and two branches of the military. V-TECS was formed in 1973 to develop catalogs of performance objectives, criterion-referenced measures, and performance guides for use by teachers in vocational-technical education. Each member state is charged with developing no less than two catalogs each year for specific occupational areas and for making them available to other member states. V-TECS catalogs are available through the Division of Vocational Education.

V-TECS catalogs contain a complete job-sequence list of tasks performed by workers in specific occupational areas. The catalogs also include tasks for several closely related jobs. For example, a catalog in cosmetology would include the duties and tasks normally performed by a cosmetologist, manicurist, managing or master cosmetologist, or wig dresser.

Performance objectives are stated for each of the listed tasks, and the performance guides explain step-by-step how each task is to be performed on the job. Standards that indicate the minimal acceptance level of performance are also included. In addition, the catalogs contain criterion-referenced test items and a list of tools and equipment used in the occupation.

Competencies

The ultimate goal of any vocational education program is to prepare students to be successful on the job. In preparing students for on the job competency, vocational education must accurately reflect the attitudes, knowledge, and skills required in today's occupations. The unique feature of a Florida/V-TECS catalog is that it is a compilation of data gathered from workers on-the-job about what they do and how they do it. Validated objectives, performance guides, and criterion-referenced measures are based on worker surveys. Thus, each catalog is a valuable source of occupation information for vocational educators, complementing both current and future programs.

Using V-TECS catalogs in instruction helps the teacher meet the needs of individual students and includes measurable performance objectives which are derived from skills demanded in the world of work. Thus, the catalog is a major aid in identifying local occupational competencies essential to success on the job.

Secondary Method of Task and Competency Identification

In the absence of V-TECS catalogs, the LEA evaluation team should develop local procedures and materials suitable for competency identification.

The first step in competency identification begins with the assembly of the occupational advisory committee. During this meeting, the evaluation team can take advantage of informal data collection based on group and individual contributions. This meeting permits:

1. Efficient use of time and expert knowledge.
2. Interchange of ideas and information from a variety of occupational areas.
3. Clarification of the plan of procedure.

The coordinator of evaluation should guide the meeting of the occupational advisory committee, and provide the agendas and necessary materials and literature for the meeting.

The second step in competency identification is to organize a task-analysis team within the LEA. This team will develop procedures and materials for identifying occupational tasks and competencies required for job performance. The task analysis team (normally selected from the evaluation team or appointed by the team leader) may use any or all of the approaches for identifying tasks and competencies shown in Appendix A.

Writing a job description. A job description is normally a paragraph or two stating what a person does in an actual job setting. It tells something about the conditions under which the job is performed but does not give broad statements about what a person knows.

The best way to write a job description is to think about what is done on the job and to think about the conditions under which the work is performed. By using this method, specific tasks required in the job may be listed. As an example, the job description of an electrician may indicate that work is often accomplished in attics and basements of houses, as well as outside under varying weather conditions.

All classes of tasks which are performed on the job should be included in the job description, even though they may not relate to the basic skills required. If for example, the job description under consideration is that of an auto mechanic, and if the job requires a person to fill out certain forms, then this task should also be included in the job description.

A properly written job description characterizes a job as it actually is, not as one would like it to be (a sample job description is given in Appendix B).

Task analysis. The first step in task analysis is to identify and list the various elements necessary to complete a particular job. This process is referred to as task listing and can involve a number of activities. One such activity is

introspective analysis. Simply stated, introspective analysis is looking at one's job and, from experience, identifying the tasks involved (see Appendix C for representative samples).

Another method frequently used to identify tasks is to critically review the description of the job being analyzed. From this review, many important tasks can be identified and listed for further analysis.

Although these two methods are frequently used to identify tasks, they are not considered to be the best. Direct observation of workers performing their jobs coupled with personal interviews has proven to be the most effective method for identifying the various tasks involved in a particular job. When this method is used, it is useful to list all tasks on a simple form so that information regarding logical sequence, frequency of performance, and importance can be recorded. (Appendix D).

The second step in task analysis is to list the steps (details) involved in performing the task. In task detailing, information is given regarding the steps involved, the type of performance necessary, and the relative difficulty in performing the task.

Competency identification. The goal in competency identification is to identify tasks critical to a particular job, and then to define the sub-tasks (steps) necessary to accomplish the various tasks. Task identification systematically clarifies what is done in a given occupation, that

is, what tasks must be accomplished to complete a particular job. In addition, task identification sorts the occupational requirements according to their frequency, complexity, and importance. "Frequency" refers to the number of times a specific task is used or performed. "Complexity" refers to the difficulty of task performance, and "importance" refers to the occupational value of the specific task.

Competency identification separates each task into sub-tasks or competencies considered essential for job success. In addition, competency identification is essential in answering the question: "Do program completers possess the skills or competencies which potential employers view as most important for successful job performance?"

As noted on Appendix A, Task and Competency Identification, direct observation of worker's performance on the job, provides the most accurate method of task analysis and competency identification. By first writing a job description, then compiling a list of critical tasks, and finally listing essential sub-tasks, the LEA team will have a better basis for determining competencies necessary for successful job performance. Appendices B through E are provided to aid the team in arriving at details of specific tasks.

Subdividing jobs and tasks. This section is provided to show how a specific job, Radio and Television Service Technician, can be broken down or subdivided into various

tasks required for successful demonstration of task performance. By following the example in Table 1, the LEA may arrive at a detailed breakdown of any job. The various sub-components (task and competencies) of any given job may be more easily identified using the results of the subdivision procedure.

Table 1

Partial Task, Sub-Task and Competency Identification for Radio and Television Service Technician

1.0 Radio and Television Service Technician (job)
1.1 Reads electronic schematics (task)
1.1.1 Identifies symbols (competency)
1.1.2 Identifies values and markings of symbols
1.1.3 Determines DC operating voltages and currents
1.1.4 Determines signal flow
1.1.5 Locates parts in chassis
1.1.6 Makes electrical measurements
1.1.7 Interprets electrical measurements
1.2 Checks electronic components (task)
1.2.1 _____ _____(competency)
1.2.2 _____ _____
1.2.3 _____ _____

Measure of Competencies of Program Completers

The desired outcome of an occupational program or course is that the needs, abilities, and goals of program participants are matched with the needs of prospective employers. Upon completion of a given program, each participant should have successfully acquired those competencies which are desired by employers. A measure of competencies of program completers should examine such questions as: (1) Are jobs being performed successfully by program completers? (2) Are program completers working at jobs suitable to their career goals and to employer needs? and (3) Did the training program adequately prepare program completers with those competencies required for successful employment?

An effective evaluation of occupational competencies requires that the local education agency arrive at some measure of the competencies possessed by program completers so that a discrepancy analysis can be made between those competencies identified as essential to job success and those actually developed.

Several sources of information are available to the local education agency for obtaining a measure of the competencies of program completers. Among these sources are:

1. Former graduates.
2. Employment supervisors.
3. Performance ratings on the job.
4. Ratings of a team of practitioners.

Competency information from program graduates, employment supervisors, and performance ratings may be obtained from emplcyer and student follow-up activities described in Component Twelve of this guide.

A team of practitioners working in the field may be invited to randomly select and test students near graduation to determine what specific competencies have been acquired by prospective graduates. Types of broad questions which may be asked by the evaluation team to assess the competencies of program graduates are:

1. Can the student correctly perform all tasks necessary for entry into the job for which he/she has been trained?
2. Can the student perform the tasks independently or must the student constantly check with the supervising instructor?
3. Are the steps necessary to complete a task performed in the same or very similar manner as those steps which are performed on the job?

The LDE team may wish to answer these questions in the form of a criterion-referenced performance rating or through observation. A criterion-referenced performance rating is used to classify a student into a mastery or non-mastery category with regard to specific performance objectives. An example of the type of criterion-referenced performance rating which may be used by the team is given in Appendix H.

The criterion-referenced performance ratings should be

developed by the LEA in a form that is adaptable to additional tasks. Test items should match those for successful job entry. The LDE team should be able to observe and to rate the acceptability of student competence in performing the tasks listed on the performance rating developed from the task analysis.

By comparing the essential competencies for successful employment with those competencies acquired by program graduates, a discrepancy analysis may be conducted.

Discrepancies

A discrepancy analysis should be conducted between those competencies identified as necessary for successful employment and those competencies actually acquired by program completers. Using data available from student and employer follow-up studies and data generated from the performance rating of a random sample of program completers regarding acquired competencies, the LEA can conduct a discrepancy analysis. Discrepancy analysis allows the LEA to make recommendations for program changes so that the needs of students are more adequately served. (An example of simplified discrepancy analysis is given in Appendix H).

III. Using Evaluation Data

The most important part of the competency evaluation is the implementation of results. Competency information may be used to write or revise student performance objectives. In addition, results of competency evaluation can be used to update occupational training programs by comparing current educational objectives with actual requirements for job entry and advancement. The necessity for program revision in order to meet employer and student needs may be the most important finding in conducting a competency evaluation.

In short, competency evaluation compares what students are expected to learn with what they are actually learning in instructional settings.

IV. Summary

The success of occupational programs depends on the ability of the programs to produce competent workers. This component is designed to help the LEA identify the occupational competencies necessary for job entrance and continued employment of program completers. Competency and task indentification have been described as well as methods for writing job descriptions and analyzing tasks. Methods for measuring competencies acquired by program completers have been presented along with suggestions for a discrepancy analysis between competencies needed by program completers and competencies acquired. The evaluation of occupational competencies will help justify decisions regarding program offerings and assure harmony between vocational education programs and final placement job requirements.

Detailed List of Tasks Required to Conduct Competency Evaluation

For clarification, a detailed breakdown of tasks required for conducting competency evaluation is presented in this section.

1.0 Determine competencies needed by graduates.

- 1.1 Conduct a search for existing task analysis applicable to the job.
  - 1.1.1 Use V-TECS catalogs to determine tasks and competencies required for specific jobs.

1.1.1.1 Review each task and performance objectives described in V-TECS catalogs.

1.1.1.2 Determine if the tasks and performance objectives given are appropriate.

1.1.1.3 List identified competencies on discrepancy analysis form.

1.1.2 Develop procedures and materials suitable for competency identification.

1.1.2.1 Write job description of jobs in which graduates will become employed and for which they are trained.

1.1.2.2 List all tasks which are included in the job.

1.1.2.3 Subdivide tasks into competencies necessary for successful task performance.

1.1.2.4 Compile a list of necessary competencies.

2.0 Measure competencies of program graduates.

2.1 Gather data on competencies acquired by previous graduates.

2.1.1 Collect performance rating data from employment supervisors.

2.1.2 Analyze data to determine employer satisfaction with competencies acquired by former graduates.

2.2 Utilize a team of practitioners to determine competencies of program graduates.

2.2.1 Select a random sample of students near graduation to participate in a criterion-referenced performance rating.

2.2.2 Develop a criterion-referenced performance exercise.

2.2.3 Administer the criterion-referenced performance exercise to random sample of students near graduation.

2.2.4 Have team of practitioners rate the performance of each student who participates in the performance rating exercise.

3.0 Determine discrepancies between competencies acquired by program graduates and competencies required for job success.

3.1 Analyze competency data generated from criterion-referenced performance rating and employer satisfaction with former graduates.

3.1.1 Observe satisfaction of employers with competencies of students from employer follow-up study.

3.1.2 Record competencies of program graduates from criterion-referenced performance rating.

3.2 Identify discrepancies between competencies acquired by program graduates and competencies needed for job success.

3.2.1 Compare those competencies needed by program graduates and those acquired by graduates.

3.2.2 Indicate discrepancies between competencies needed and competencies acquired.

3.3 Develop recommendations for program improvment and revisions.

3.3.1 Suggest program revisions; give students additional training.

3.3.2 Recommend on-the-job training.

V. Sample Evaluation Materials

	Appendix
Task and Competency Identification Methods	A
Sample Job Description	B
Representative Example of Tasks	C
Sample Task Listing Sheet	D
Task Listing Sheet	E
Sample Task Detailing Sheet	F
Task Detailing Sheet	G
Sample Performance Rating Sheet	H
Performance Rating Sheet	I

APPENDIX A

TASK AND COMPETENCY IDENTIFICATION METHODS

Method	Description	Advantages
1. Observation of Persons on-the-job	A method for collecting and recording information about a job based on direct observation and personal experience.	The most accurate description of a job can be derived by using this method.
2. Personal Interviews	A method of data collection based on the knowledge and experience of the person working on the job.	Clarification of responses made immediately, flexible schedules can be developed and first-hand information can be collected.
3. Mailed Questionnaires	A method to collect data from a large sample of respondents where a person can feel more at ease in responding.	Can be widely circulated to include more respondents; inexpensive and efficient.
4. Interview by Phone	A data collection method appropriate for short interviews; similar to direct observation.	Inexpensive collection of data; flexibility in time schedules; convenient and efficient.
5. Literature Search	A method of collecting data on activities and conditions which existed in the past; plus pointing to the current state-of-the-art on a given topic.	Can lead to better and more appropriate methods; relatively inexpensive and efficient.

APPENDIX B

Sample Job Description
(Stenographer)

A stenographer is primarily involved in taking shorthand by hand or machine and transcribing it with a typewriter. A stenographer's work requires: the ability to understand the meaning and relationships of words and sentences; finger dexterity and eye-hand coordination for taking dictation or typing; form perception to recognize shorthand symbols; adaptability to routine, repetitive, and uninvolved tasks; attention to detail in dictation or typed materials to avoid error; willingness to work according to instructions; ability to work with specialized terminology, such as that in the medical, legal, or engineering fields.

Dictionary of Occupational Titles: pg. 13

APPENDIX C

REPRESENTATIVE EXAMPLE OF TASKS

Occupational Field	Job	Tasks
Agriculture: Ornamental Horticulture	Nursery Operator	Keep records; Control plant diseases and insects; Fertilize plant materials; Plant Seeds; Maintain irrigation system; Select plant materials; Construct and assemble equipment; Plant and transplant; Buy supplies, equipment and materials; Construct and maintain buildings, etc.
Business: Steno-Secretarial	Secretary	Take dictation in shorthand; Transcribe dictation on typewriter; Answer telephone; Place outgoing calls; Schedule appointments; Keep personnel records; Supervise clerical workers; Pay bills; Compile and type general reports; Interview and schedule for prospective employees; etc.
Homemaking: Food Service	Cook	Take directions from others; Maintain personal cleanliness; Clean work areas; Answer questions regarding food and service; Bake, roast, boil, steam or fry foods; Observe and test food being cooked; Store food correctly in proper areas; Portion food on serving plates; Plan of participate in planning menus; Price items on menu; etc.
Distributive Education: Marketing	Food Products Salesman	Sell food products; Call on Customers; Demonstrate items; Collect payments; Stock shelves; Prepare reports; Display products; Prepare forms and sales contracts; Keep expense account; Install equipment; etc.
Trade and Industrial: Electricity-Electronics	Electrician	Use hand tools; Follow diagrams; Activate machine tools; Read blueprints; Follow manufacturing specifications; Recommend changes in circuitry; Plan new layouts; Operate bench lathes; Operate power stud gun; Pull wire through conduit etc.

APPENDIX D

SAMPLE TASK LISTING SHEET

Job: Radio and Television Service Technician

Task	Frequency of Performance	Importance	Learning Difficulty	Comments
Troubleshoots and repairs malfunctioning equipment	Everyday occurrence	1	Difficult	List all major tasks
Reads electronic schematics	1 to 10 times a day	2	Moderate	Describe how often the task is done.
Perform Chassis layouts	Once a week	2	Easy	Tell how important the task is.
Uses small hand tools	Continuously	1	Easy	Explain your estimate of how difficult the task is to learn.
Check eletronic components	Frequently	1	Moderate to very difficult	
Perform calibration of test equipment	Once a month	3	Difficult	
Specifies and orders electronic equipment	Frequently	3	Easy	
Applies first aid procedures	Very rarely	1	Moderate	

Form Adapted from: Mager, R.F., and Beach, K.M. Developing Vocational Instruction Fearon Publishers: Palo Alto, Californis. 1967

APPENDIX E

TASK LISTING SHEET

Job:

Task	Frequency of Performance	Impor-tance	Learning Difficulty	Comments

APPENDIX F

SAMPLE TASK DETAILING SHEET

Task: Reads Electronic Schematics

Steps in Performing the tasks (competencies)	Type of Performance	Learning Difficulty	Comments
Identify symbols	Recall	Easy	Emphasize what the person can do. (not know)
Identify values and markings of symbols	Recall	Easy	Think of all steps
Determine DC operating voltages and currents	Discrimination	Moderately difficult	Memory Aid (the following might be included).
Determine signal flow	Problem Solving	Difficult	Recognize when to perform the task.
Locate parts in chassis	Discrimination	Easy	Select appropriate tools and materials.
Make electrical measurements	Problem Solving	Difficult	Locate the correct objects on which to work
Interpret electrical measurements	Problem Solving	Difficult	Perform the safety procedures associated with the task.

Form adapted from: Mager, R.F., and Beach, K.M. Developing Vocational Instruction Fearon Publishers: Palo Alto, California. 1967

APPENDIX G

TASK DETAILING SHEET

Task:

Steps in Performing the tasks (competencies)	Type of Performance	Learning Difficulty	Comments

APPENDIX H

SAMPLE PERFORMANCE RATING SHEET

Student:_____

Instructions: After observing the potential graduate's performance on the tasks given, each team member should rate the student's performance in the appropriate column.

Performance Rating: Radio and Television Service Technician

Performance Objective	Tasks Required of Program Completers	Competence Rating		For Use by Local Education Agency
		Acceptable	Unacceptable	Recommendation
Given and electronic circuit which is malfunctioning, the student must be able to read the circuit diagram and codes, and to identify the malfunctioning component, and to repair or to replace the defective component and bench check for service ability.	Reads electronic schematics		X	Program revisions are necessary to give students additional competencies.
	Checks electronic components	X		
	Determines malfunctioning using appropriate testing equipment	X		
	Uses small hand tools correctly	X		
	Replaces malfunctioning component		X	On-the-job training can alleviate identified deficiencies.
	Checks circuit to determine whether it functions properly			

APPENDIX I

PERFORMANCE RATING SHEET

Student:_____

Instruction: After observing the potential graduate's performance on the tasks given, each team member should rate the student's performance in the appropriate column.

Performance Rating:

Performance Objective	Tasks Required of Program Completers	Competence Rating	For Use by Local Education Agency
		Acceptable-Unacceptable	Recommendation

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Glossary

Criterion-Referenced Performance Rating: test or rating to categorize persons into mastery or non-mastery of performance objectives.

Sub-Task: competencies required within a given task.

Task Analysis: a clarification of tasks which are performed in a given job.

V-TECS (Vocational-Technical Education Consortium of States): a voluntary organization consisting of 20 states and two branches of the military. V-TECS was formed to develop catalogs of performance objectives, criterion-referenced measures, and performance guides for use by teachers in vocational-technical education.